

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-19. (Canceled)

20. (Currently amended) A composition comprising a mesenchymal stem cell (MSC) incorporated with a nucleic acid which encodes a hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in an amount sufficient to create an ion channel in the MSC, wherein the MSC ~~is capable of forming~~ forms a gap junction with a cell of a mammalian heart.

21-48. (Canceled)

49. (Previously presented) A method of expressing a functional hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in a mammalian heart comprising: (1) preparing the composition of claim 20; and (2) site-specifically introducing the composition directly into the heart, wherein the MSC forms a gap junction with a cell of the heart.

50. (Canceled)

51. (Previously presented) A method of treating a cardiac rhythm disorder in a mammal, wherein the disorder is at least one of conduction block, complete atrioventricular block, incomplete atrioventricular block or sinus node dysfunction, which method comprises site-specifically introducing directly into the mammal's heart the composition of claim 20 in an amount sufficient to induce pacemaker current expression at the site, thereby treating the rhythm disorder in the mammal.

52-55. (Canceled)

56. (Previously presented) The method of claim 51, wherein the composition is introduced by topical application to cells of the heart, injection, microinjection or catheterization.

57. (Previously presented) A method of inducing a pacemaker current in a mammal's heart which comprises site-specifically introducing directly into the heart the composition of claim 20 in an amount sufficient to induce a pacemaker current in the heart, wherein the MSC forms a gap junction with a cell of the heart, thereby inducing a pacemaker current in the heart.

58. (Canceled)

59. (Previously presented) A method of inducing a pacemaker current in a cardiomyocyte which comprises contacting the cardiomyocyte with the composition of claim 20 in an amount sufficient to induce a pacemaker current in the cardiomyocyte, wherein the cardiomyocyte forms a gap junction with the MSC, thereby inducing a pacemaker current in the cardiomyocyte.

60-64. (Canceled)

65. (Currently amended) A composition for delivering a pacemaker current to a mammalian heart comprising a mesenchymal stem cell (MSC) incorporated with a nucleic acid which encodes a hyperpolarization activated, cyclic nucleotide gated 2 (HCN2) ion channel in an amount sufficient to create an ion channel in the MSC and deliver a pacemaker current when site-specifically introduced directly into the heart, wherein the MSC ~~is capable of forming~~ forms a gap junction with a cell of the heart.

66. (Currently amended) A method of inducing a pacemaker current in a mammal's heart which comprises site-specifically introducing directly into the heart the composition of claim ~~20~~ 65 in an amount sufficient to ~~inducing~~ induce a pacemaker current in the heart, wherein the MSC forms a gap junction with a cell of the heart, thereby inducing a pacemaker current in the heart.

67. (Previously presented) A method of inducing a pacemaker current in a cardiomyocyte which comprises contacting the cardiomyocyte with the composition of claim ~~20~~ 65 in an amount sufficient to induce a pacemaker current in the cardiomyocyte, wherein the cardiomyocyte forms a gap junction with the MSC, thereby inducing a pacemaker current in the cardiomyocyte.